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THE
PRACTICE OF NAVIGATION,
ON A
NEW PLAN:
BY MEANS OF
A QUADRANT
OF
DIFFERENCE OF LATITUDE AND DEPARTURE;
AND
AN EASY AND TRUE METHOD,
OF BRINGING
DEPARTURE INTO DIFFERENCE OF LONGITUDE,
AND VICE VERSA,

Without the Uſe of a Variety of NAUTICAL TABLES, or any
Knowledge in TRIGONOMETRY:

The whole calculated to inſtruct the moſt common Capacity in this uſeful
Branch of Knowledge.

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PREFACE.

IF this little Treatiſe has any merit, the world will ſoon diſcover it. If it has *none*, it might be uncharitable to treat it with contempt. I dedicate its utility to the young and ignorant; and ſolicit indulgence from men of ſcience and genius. If I pretended to raiſe its value by depreciating books which contain ſyſtems of mathematical navigation, I ſhould hold myſelf guilty of irreverence and diſreſpect to the memory of many great and worthy names.

Indeed I ſhould do wrong to recommend, much more to extol it, any further than it proved of utility to myſelf, when the *ſcheme* firſt occurred to me. At that time, I had not the ſmalleſt ſyſtematical knowledge in navigation; and often wondered at my own ignorance, when I reflected upon the length of time I had been at ſea. I had often heard them talk of Difference of Latitude and Departure, Allowance for Leeway, Variation of the Compaſs, Heave of the Sea, the Action of Tides and Currents, without in the leaſt comprehending what was meant. All of a ſudden, one day, at ſea, I was determined, by ſome means or other, to learn how to work a day's work, and keep a reckoning. I got a Daily Aſſiſtant, a Mariner's Compaſs, a Robertſon's Elements, &c. and applied myſelf diligently for about two hours—when my head began to ach, and my ideas became confuſed:

I put away the books—yaun'd—ſcratch'd my temples—went to bed—rav'd—and, the preſent work is the reſult of the dreams of that night. Whoever doubts what I aſſert, does me an injury: but, as I allow of an univerſal toleration of belief and ſentiment in all trivial matters, I can readily forgive it.

There are many ſea-faring people who underſtand the common manœuvres of a ſhip; but cannot keep a reckoning. To ſuch, in particular, this work will be uſeful.

Deſcription of the Quadrant of Difference of Latitude and Departure.

BOTH ſides of the quadrant are ſcales of equal parts, divided into nine diviſions or inches, each of which is ſubdivided into tenths; and there are parallel lines croſſing at right angles for determining the difference of latitude and departure. The ſweeps, or concentric arches of diſtance, on either ſcale, lead to any point or courſe ſteered by.

The radii, or points of the compaſs, 1, 2, 3, 4, &c. divide the arches into eight equal parts, each of which is ſubdivided into the half and quarter points of the compaſs. The external arch is graduated into 90 degrees of the compaſs, and determine the angle of the courſe.

The ſcales of the quadrant may be either reckoned 90 miles, or 90 leagues, or 90 degrees, according to the extent of the queſtion to be ſolved.

In bringing departure into degrees of longitude, obſerve as a rule, *for the odd miles*, that if the degree of longitude in queſtion conſiſts of 40 miles, then ſay, If 40 miles be 60 minutes, how many minutes will 10 odd miles, of the ſame degree of longitude, be equal to?

Upon this principle of proportion, a table, to ſhew how many *minutes* any number of odd *miles* of any degree of longitude in any latitude, is equal to, may be eaſily made.

THE

PRACTICE OF NAVIGATION,

BY A

NEW METHOD, &c.

THE grand uſe of Navigation is to enable us to conduct a ſhip from one place to another; i. e. to know the courſe and diſtance from one port to another; to find the ſhip's place at ſea, or how many miles or degrees a ſhip is eaſt or weſt, north or ſouth, from any fixed place; as the Start, the Lizard, &c. And although this can never be reduced to an abſolute certainty, yet, by accuracy and attention to circumſtances, we may come very near the truth.

Having found what latitude and longitude the ſhip is in, the next principal thing is to know what courſe we are to ſteer for our intended port, and the diſtance from it—all which is made plain and eaſy in this ſmall work.

In uſing the quadrant of difference of latitude and departure, firſt, obſerve that it may always lay before you in the ſame poſition, if you reckon by the degrees, or the number of points of the compaſs.

But, ſecondly, if you are guided by the names of points, as weſt, ſouth-weſt, ſouth-eaſt, &c. then the quadrant may be ſhifted according

ding to the quarter of the compaſs your courſe is in; that is, if you are ſteering between north and weſt, it is placed as

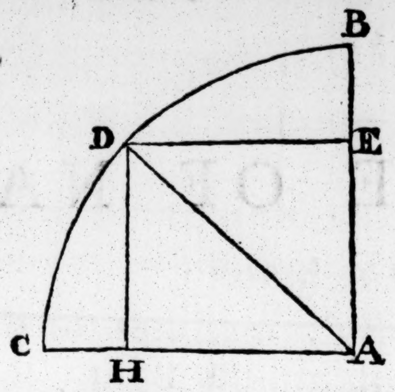


Figure I.

where the line A C is weſt, and the line A B is north, from A.—If you ſail between weſt and ſouth, the quadrant is placed as

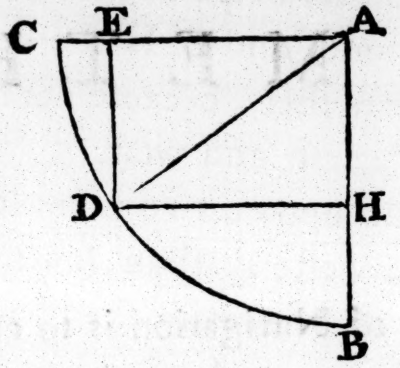


Figure II.

where A C is weſt, and A B ſouth.—If you ſail between the ſouth and the eaſt, it is placed as

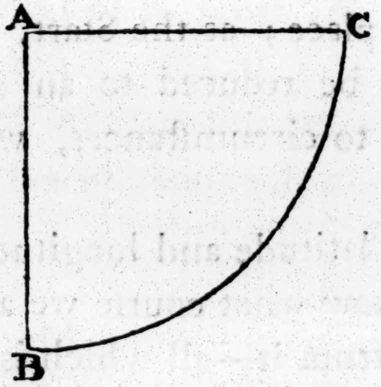
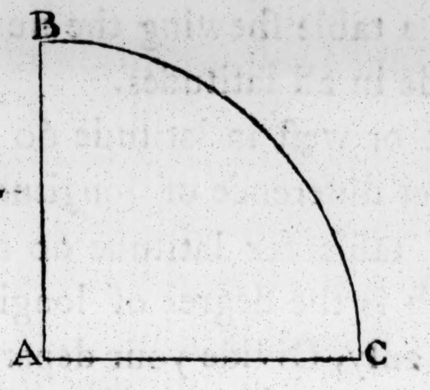


Figure III.

where A C is eaſt, and A B ſouth.—Laſtly, if your courſe is between the eaſt and north, it is placed as

Figure

Figure IV.



where A C is eaſt, and A B north.

The arch, or ſweep B C, meaſures the diſtance ſailed from A upon any courſe between C and B.

Suppoſing a ſhip ſails from A to D (Fig. I.), which is north weſt, then, A D being the courſe, or point of the compaſs ſteered upon, A E is the difference of latitude, and A H the departure, or longitude weſt from A—equal to one another, becauſe north weſt (or four points) is in the middle between north and weſt.

But, if the ſhip ſails upon a two point courſe, as weſt ſouth weſt, then, as ſhe ſails more weſterly than ſoutherly, the departure or difference of longitude will be greater than the difference of latitude.

EXAMPLE.

Fig. II. If a ſhip ſails from A to D, then A E is the departure, and A H the difference of latitude. Let theſe ſerve as examples for all the different courſes and diſtances in the quarters of the compaſs.

The principal thing in this mode of navigation to be underſtood, is, how to bring departure into degrees of longitude; than which nothing can be more ſimple.

In ſolving the various queſtions of Mercator's ſailing, it is alſo neceſſary, on the contrary, where longitude is given, to find the departure.

And as this buſineſs depends ſolely upon a conſideration of the number of miles in a degree of longitude in half the difference of latitude,

titude, I have given a table ſhewing the number of miles anſwering to a degree of longitude in all latitudes.

If a ſhip ſails eaſt or weſt in latitude 60 north, till her departure is 60 miles, what is her difference of longitude?

1ſt, Look in the table for latitude 60 degrees, and againſt it you find 30 miles, which is the degree of longitude in this latitude.

30) 60 (2 degrees.
60
—

2dly, Divide your departure by this degree of longitude, and you have 2 degrees difference of longitude, as in the margin.

Now, let us reverſe the queſtion, and ſay, If a ſhip ſails eaſt or weſt in latitude 60 degrees, till her difference of longitude be 2 degrees, what is her departure?

RULE I. In the ſame manner, find in the table the number of miles anſwering to a degree of longitude in latitude 60 degrees, and you find 30 miles.

30
2
—
60

RULE II. Multiply the number of miles in the degree of longitude for latitude 60, by the difference of longitude, as in the margin, and you have 60 miles departure.

Theſe two examples, the firſt, to find the difference of longitude where departure is given; and the ſecond, to find the departure where the difference of longitude is given, may ſerve as examples in all caſes where departure, or difference of longitude, is made, on any parallel of latitude.

Again, where departure is made by ſailing from a greater latitude to a leſs, or, from a leſs latitude to a greater—If a ſhip ſails ſouthward from latitude 50 degrees north, to latitude 30 degrees north, and her departure is 1000 miles eaſt or weſt, I demand the difference of longitude.

RULE I. Find the difference of latitude between 50 degrees and 30 degrees, thus—Subtract 30 from 50, and there remain 20 degrees difference of latitude. Half the difference of latitude is 10 degrees, which add to the latitude of the place arrived at, viz. 30 degrees, and you have latitude 40 degrees.

Rule II. Take a degree of longitude in half the difference of latitude, and divide the departure by it.

46) 1000 (21° 34′
92
80
46
34

Half the difference of latitude, in the preſent caſe, is latitude 40 degrees; wherefore, look in the Table for latitude 40 degrees, and you have 45 miles 95 parts, viz. 46 miles to a degree of longitude—with theſe 46 miles divide your departure, as in the margin, and you have 21 degrees, and 34 miles.

60
46
14

But, as 46 miles to a degree of longitude are here looked upon to be equal to 60—every degree being ſuppoſed 60 minutes; ſo the odd 34 miles muſt be equal to a greater number than 34 minutes: to find which, ſubtract 46 (the degree of longitude in half the difference of latitude) from 60, and there remains 14 miles.

34
14
48

Add 14 miles to the odd 34 miles, and you have 48 miles. But as 48 miles are more than 1 degree of longitude in latitude 40, divide it by 46, and you have 1 degree and 2 minutes: wherefore, that being added to 21, the difference of longitude is 22 degrees and 2 minutes weſt.

22° 2′
46
134
88
1014

Now, to reverſe the queſtion; if the difference of longitude had been given, viz. 22 degrees weſt, and the departure had been required, *multiply* the *difference* of longitude by the degree of longitude in *half* the difference of latitude, viz. by 46, and you have 1014 miles: but in the former queſtion, for difference of longitude, as we added the odd miles, we muſt now ſubtract them, and there remains the 1000 miles departure. Let this be a fixed rule.

Examples, ſerving more fully to explain what is meant in this Treatiſe by half *the Difference of Latitude, in order to find the Number of Miles anſwering to a Degree of Longitude in any Latitude.*

Case I. If a ſhip ſails from the Equator till ſhe is in latitude 20 degrees north or ſouth, then 10 degrees is *half* the difference of latitude.

In

In this caſe, if it was required to look out in the table for the number of miles anſwering to a degree of longitude in *half* the difference of latitude, we have nothing more to do than to fix upon latitude 10 degrees. It gives 59 miles 08 parts, or 59 miles; *the odd parts being never conſidered, unleſs they are above 50, when we reckon them 1 mile.*

Case II. If a ſhip ſails from latitude 50 north, till ſhe is in latitude 20 north, and you want to know the number of miles in a degree of longitude at *half* the difference of latitude, what degree is to be fixed upon?

Rule I. Subtract 20 degrees from 50 degrees, and you have 30 for the *whole* difference of latitude.

Rule II. Add *half* the difference of latitude (15 degrees) to the latitude of the place arrived at, viz. to 20 degrees, and it gives latitude 33 degrees, for finding the number of miles in the degree of longitude.

Case III. A ſhip ſails from latitude 36 degrees north to latitude 50° north, what is the degree called *half* the difference of latitude?

1ſt, Subtract 36 degrees from 50 degrees, and 14 degrees is the *whole* difference of latitude.

2d, Add 7 degrees, or the *half* of 14 degrees, to the latitude of the place ſailed from, and you have latitude 43 degrees, for finding, in the Table, the number of miles anſwering to a degree of longitude in that latitude.

We ſhall next proceed to work ſome caſes, or anſwer queſtions, of Mercator's ſailing.

Having ſubjoined rules for latitude and longitude, I refer to them in caſes of doubt.

Case I. *To find Courſe and Diſtance.*

What courſe and diſtance muſt a ſhip ſail from a place in latitude 50 degrees 00 m. north, and longitude 03 degrees 10 minutes weſt, to a place in latitude of 17 degrees 10 minutes north, and longitude 59 degrees 11 minutes weſt?

For

For finding Difference of Latitude.

Latitude ſailed from	50° 00′ N.
Latitude bound to	17° 10′ N.
Difference of latitude in degrees,	32° 50′ N.
	60
Difference of latitude in miles,	1970

For Difference of Longitude.

Longitude bound to	59° 11′ W.
Longitude ſailed from	03° 10′ W.
	56° 01′ W.
	60
Difference of longitude in miles,	3361

As we reſolve all queſtions by the meaſurement of triangles, you will obſerve, that every ſide muſt be meaſured by a ſcale of the ſame equal parts.

We meaſure this queſtion by degrees of 60 miles. The difference of latitude is 32 degrees 50 minutes, and the difference of longitude is 56 degrees 01 minutes—but theſe degrees of longitude do not conſiſt of 60 *miles*.

To lay the difference of longitude down exactly in degrees which will correſpond with the difference of latitude, you muſt bring the difference of longitude into departure, and then divide it by 60.

To bring it into departure, you muſt multiply it by the degree of longitude in *half* the difference of latitude—*it* being added to the latitude of the place bound to.

16° 25′
17° 10′
33° 35′

Half the difference of latitude is 16 degrees 25 m. which, added to the latitude of the place bound to, 17 degrees 10 minutes, is 33 degrees 35 minutes. But we ſhall call it 34 degrees: wherefore, look in the Table for latitude 34, and you find 49 miles and 74 parts; that is, 50 miles to a degree of longitude in that

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         56° 01'
         50°
     ---------------
60 ( 2801 ( 46° 41'
     240
     ----
      401
      360
      ---
       41
```

that latitude. With theſe 50 miles multiply the degrees of difference of longitude 56 degrees 01 minute, and divide by 60. It gives 46 degrees 41 minutes. But as 50 miles are ten leſs than 60, you muſt take 10 from the odd 41 miles, and there remain 31. So that your proper difference of longitude, in degrees equal to thoſe of latitude, is 46 degrees 31 minutes.

Now, to find the courſe and diſtance, proceed thus:

As we have to ſail ſouth and weſt, place the quadrant as Fig. II. Fix upon the difference of latitude 32 degrees 50 minutes, (allowing a tenth of an inch to a degree), as from A to H. Count alſo the difference of longitude 46 degrees 31 minutes, as from A to E. Then, where E D or H D cuts A D in D, will be the courſe; and the ſweep or arch D C, or D B, leads to the diſtance A C or A B, which is meaſured upon A C or A B.—You will find your courſe upon the quadrant to be ſouth weſt three quarters weſt neareſt; or ſouth 54 degrees 00 m. weſt. Your diſtance will be about 56 degrees of 60 miles (counting every tenth of an inch to a degree); which, being multiplied by 60, gives 3360 miles.

Let us reverſe the queſtion.

Case II. If a ſhip ſails from latitude 50 degrees 00 m. north, and longitude 03 degrees 10 minutes weſt, *ſouth weſt three quarters weſt*, or ſouth 54 degrees 00 m. W. till her diſtance is 3360 miles, we require the latitude come to, and the difference of longitude.

```
60 ) 3360 ( 56
     300
     ----
      360
      360
```

1ſt, Bring your diſtance into degrees; which is done by dividing 3360 by 60, it gives 56 deg. as in the margin. Lay down theſe degrees upon A C or A B, (Fig. II.) and trace the ſweep of diſtance C D, or B D, till it cuts the courſe ſouth weſt three quarters weſt in D. Then will A E, 46 degrees 31 minutes, be the departure or difference of longitude in degrees of 60 miles; and A H will be the difference of latitude 33 degrees.

But

46° 31′
60
——
50) 2791 (55° 41′
250
——
291
250
——
41

But to bring departure into proper difference of longitude, multiply the departure by 60, and divide by the degree of longitude in half the difference of latitude, viz. by 50, (as was found in CASE I.). But as 50 miles to a degree of longitude, in latitude 34 degrees, is ſuppoſed 60 minutes; ſo 41 miles, muſt be 51 minutes: wherefore your proper difference of longiude, is 55 degrees 51 minutes weſt.

50° 00′
33°
——
17

The difference of latitude being 33 degrees, ſubtract it from the latitude ſailed from, and there remain 17 degrees—the latitude arrived at.

03° 10′ W.
56° 1′ W.
————
59° 11′ W.

Longitude ſailed from was 03 degrees 10 minutes weſt, and the longitude made is 55° 51′. Add this to 03 degrees 10 minutes, and your longitude is 59 degrees 01 m. weſt.

When I firſt commenced navigator, I uſed to follow another method.

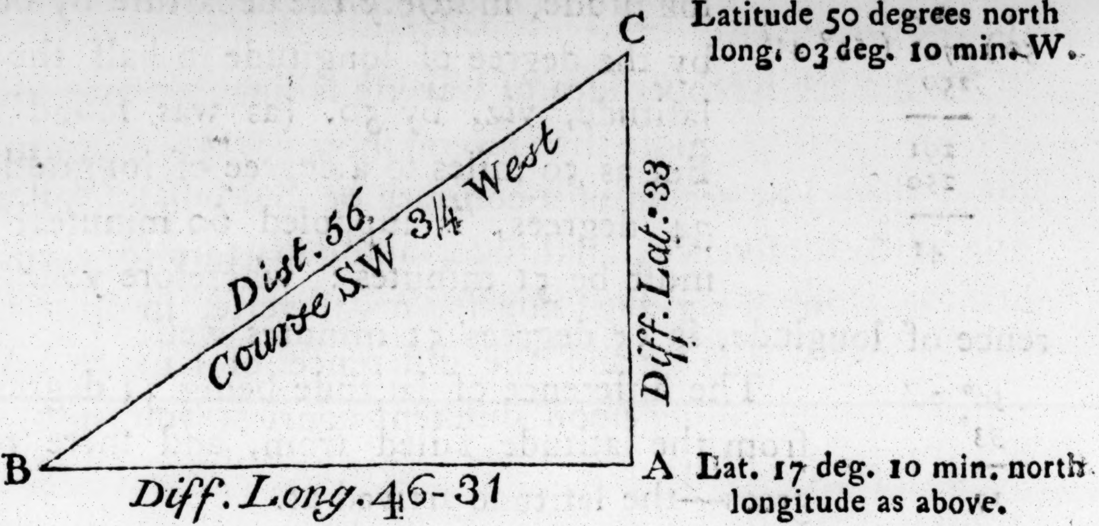
EXAMPLE.

CASE I. What courſe and diſtance muſt a ſhip ſail from a place in latitude 50 degrees 00 m. north, and longitude 03 degrees 10 minutes weſt, to a place in latitude 17 degrees 10 minutes north, and longitude 59 degrees 11 minutes weſt?

Work as in CASE I. of Mercator's ſailing, page 12, and lay down your difference of longitude 46 degrees 31 minutes, as A B, Fig. V. (allowing a tenth of an inch to a degree; ſo that A B ſhall meaſure 4 inches 6 tenths and a half.)

Secondly, Lay down your difference of latitude 33 degrees, as A C :

Figure V.



ſo that C A ſhall meaſure 3 inches and 3 tenths from A. Thirdly, Draw B C from B to C, and it will meaſure about 56 degrees, or 5 inches 6 tenths; which is your diſtance from C to B.

Now, to find the courſe, I provided myſelf with a quadrant of the compaſs, made of ivory, divided into points, half points, and quarters: I applied this to my figure, ſo that the center of the quadrant exactly reſted upon the point C (or which is the ſame thing) upon the angle B C A, and the north and ſouth line of the quadrant accurately lay upon the line C A. Then, whatever point or degree of the compaſs the line C B correſponds with on the quadrant, will be the courſe from C to B.

Here, you muſt always be certain that the angle made by the line of difference of latitude and longitude, ſhall be a right angle; otherwiſe your line of courſe and diſtance will be falſe: I mean, the angle C A B, muſt be a right angle, i. e. the line C A muſt be perpendicular to A B; and this is to be very readily known, by applying your quadrant of the compaſs to the figure, in ſuch a manner, as that the center of the quadrant ſhall reſt upon A, and the line A C ſhall correſpond with the north and ſouth; and the line A B with the eaſt and weſt point of the quadrant. This laſt mode of navigation will both amuſe and inſtruct.

Traverſe

Traverſe Sailing.

To convey a proper idea of traverſe ſailing, we may juſt obſerve, that it means nothing more than ſeveral ſhort voyages performed upon different courſes, by reaſon of a contrary or foul wind; and all required, is to find the difference of latitude, and departure for each.

In working a zig-zag courſe, or traverſe, in order to find the real courſe and diſtance; and the difference of latitude and departure a ſhip makes by ſailing upon different courſes, you muſt attend to the following particulars :

1ſt, The Variation of the Compaſs,—2dly, Leeway.—3dly, Heave of the Sea.——4thly, Tides and Currents.

Rule 1ſt. Variation, if there be any (as moſt commonly there is) muſt be allowed upon all courſes ſteered, and upon all bearings, *&c.* that are taken by the compaſs; that is, if it be eaſterly variation, it muſt be allowed to the right hand; but if weſterly variation, then to the left hand of the courſe or bearing: ſuppoſing yourſelf placed in the center of the compaſs, and looking directly forward to the point you are to allow the variation from.

Example. Suppoſe I ſteer S. W. and there is one point weſterly variation, then my true courſe will be S. W. by S. or ſuppoſe I ſet a point of land, and find it to bear by my compaſs E. S. E. and I know there is half a point eaſterly variation, then the true bearing is S. E. by E. ½ E.

Rule 2d. Lee-way (which I need not here deſcribe, being ſufficiently known to every ſeaman) muſt be allowed to the right hand of the courſe ſteered, when the larboard tacks are aboard, and to the left hand when the ſtarboard tacks are aboard.

Example. Suppoſe I ſteer N. E. by E. with the larboard tacks aboard, and make one point lee-way, then my courſe made good is E. N. E.

Rule 3d. Lee-way and Variation, when they are both to be allowed one way, that is, both to the right hand, or both to the left, add them together, and allow their ſum the ſame way they were to be allowed.

But if they are to be allowed, one to the right hand, and the other to the left, ſubtract the leſs from the greater, and allow the remainder the ſame way as the greater of them was to be allowed.

Example. Suppoſe I ſteer N. N. W. with my ſtarboard tacks aboard, and make one point lee-way, there being at the ſame time half a point weſterly variation, I would know my true courſe?

Lee-way to the left hand —— —— 1 0 point
Variation to the left hand —— —— 0 ½ point

Their ſum to be allowed to the left hand 1 ½ points, makes the true Courſe N. W. by half W.

Example 2d. Suppoſe I ſteer S. W. by W. with my larboard tacks aboard, and make 2½ points lee-way, and I have 1¼ points weſterly variation, what is my true courſe?

Lee-way to the right hand —— —— 2 ½ points
Variation to the left hand —— —— 1 ¼ points

The remainder to be allowed to the right hand 1 ¼ points, makes the true courſe W. S. W. ¼ W.

Rule 4th. When a ſhip is laying too under a main-ſail, mizen, *&c.* then obſerve how ſhe comes up and falls off, and take the middle between the two points, and from that allow the lee-way and variation as in rule 3d.

Example. Suppoſe a ſhip lying too under a main-ſail, with the ſtarboard tacks aboard, comes up E. by S. and falls off to N. E. by E. there being one point weſterly variation, and ſhe makes five points lee-way, what courſe does ſhe make good?

The middle between E. by S. and N. E. by E. is E. by N. from which, allowing ſix points to the left hand (by rule 3d.) the true courſe will be N. by E.

Rule 5th. Currents, the way they ſet you, and the diſtance you ſuppoſe you are driven by them, is to be ſet down in the traverſe table for the day, as any other courſe or diſtance.

Example. Suppoſe I try the current, and find it to ſet W. by N. *per* compaſs, 1 mile *per* hour, the variation being one point eaſterly, then if I ſail in that current 24 hours, I ſet down in the traverſe table, as a courſe. WNW. diſtant 24 miles.

Rule 6th. Heave of the ſea is to be accounted for in the ſame manner as currents: as ſuppoſe there is a great ſea heaving toward the S. W. by my compaſs, there being ½ point weſterly variation, I then ſet down in my traverſe table S. W. by S. half W. with ſo much diſtance as I judge the ſea has heaved the ſhip.

Rule 7th, At leaving the land, the oppoſite point to the bearing (with the variation allowed upon it) and the diſtance you jugde yourſelf from it, muſt be ſet down in the traverſe table, as a courſe and diſtance.

Example. Suppoſe having ¼ weſterly variation, the *Start* bears by my compaſs N. N. E. diſtant 4 leagues. The oppoſite point to N. N. E. is S. S. W. which with the variation, makes S. ¾ W. for the courſe to be ſet in the traverſe table, diſtant 12 miles.

Rule 8th. When you make the land, the bearing itſelf (with the variation allowed upon it) and the diſtance you judge yourſelf from it are to be ſet in the traverſe table, as a courſe and diſtance: This needs no example.

The following is a Traverſe Table for every Day's Work.

EXAMPLE.

A ſhip in latitude 48 degrees north, longitude 6 degrees weſt, ſails the following courſes, S. S. W. 50 miles; W. by S. 40 miles, N. W. by W. 30 miles, N. E. by E. 60 miles, N. N. W. 50 miles. What is her direct courſe, diſtance, difference of latitude and departure?

1ſt, Place the quadrant as Fig. II. and fix upon the firſt courſe as S. S. W. or 6 points; then, upon the ſcale, fix upon the arch of diſtance 50 miles (i. e. five inches) and the lines of difference of latitude and departure cutting in the courſe, will lead to the difference of latitude and departure upon the ſcales, viz. 46 miles ſouth, and 19 miles weſt; thus proceed with the other courſes: and having found the difference of latitude and departure for each courſe, mark them down in the proper columns of the table, then ſum them up; and, as you have more northing than ſouthing, take 54 ſouth from 104 north. Next, as there is more weſting than eaſting, take 50 eaſt, from 93 weſt, the whole difference of latitude is 50 miles north, and departure 43 miles weſt.

		Diff. of Lat		Departure.	
Courſes.	Diſt.	North.	South.	Eaſt.	Weſt.
S. S. W.	50		46		19
W. by S.	40		8		39
N. W. by N.	30	25			16
N. E. by E.	60	33		50	
N. N. W.	50	46			19
		104	54	50	93
		54			50
		50			43

A TABLE

A TABLE of the Latitudes and Longitudes of Places, accounting the Longitudes from the Meridian of LONDON.

Places Names.	Latitude.		Longit.	
The Coaſt of England.	D.	M.	D.	M.
Berwick	55	48	01	45W
Newcaſtle	55	12	01	30W
Stockton	54	33	01	25W
Spurn	53	45	00	13E.
Yarmouth	52	40	01	40E.
London	51	32	00	00E.
North Foreland	51	25	01	24E.
Beachy Head	50	46	00	25E
Dunnoſe	50	38	01	23
Portland	50	30	02	44
Start	50	07	03	47
Lizard	49	57	05	14
Land's End	50	06	06	00
St. Mary Scilly	49	57	06	10
Hartland Point	51	06	04	35
Lundy Iſle	51	20	04	40
Briſtol	51	33	04	35
St. David's Head	51	00	05	22
Barley Iſle	52	44	05	00
Holyhead	53	23	04	50
Liverpool	53	20	03	00
Whitehaven	54	25	03	30
Carliſle	54	47	03	05

North Latitude.

West Longitude.

The Coaſt of Scotland.

Places Names.	Latitude.		Longit.	
	D.	M.	D.	M.
Glaſgow	55	52N	04	05W
N. Part of Sky Iſle	57	45N	05	45W
N. Part Lewis Iſl.	58	20N	07	20W
St. Kilday	57	52	09	45
Fara Head	58	34	05	10
Iſles of Orkney	59	10	03	22
Shetland S. Point	60	04	02	00
Buchanneſs	57	45	01	18
Aberdeen	57	24	01	40
Dundee	56	28	02	40
Edinburgh	55	58	02	59

North Latitude.

West Longitude.

The Coaſt of Ireland.

Places Names.	Latitude.		Longit.	
Dublin	53	12	06	56
Wexford	52	13	07	27
Waterford	52	09	08	40
Cork	51	49	09	30
Cape Clear	51	17	11	10
Limeric	52	23	09	35
Galway	53	07	09	40
Slime Head	53	20	11	15
Londonderry	55	00	07	50
Belfaſt	54	39	06	30

North Latitude.

West Longitude.

The Coaſt of Holland and Flanders

Places Names.	Latitude.		Longit.	
Scaw	57	30N.	10	20E.
Helighland	54	24N.	08	35E.
Hambrough	53	41N	10	35E.
Embden	53	05N.	07	35E.
The Fly	53	15N.	05	30E.

Places Names.	Latitude.		Longitude.	
The Coaſt of Holland and Flanders.	D.	M.	D.	M.
	North Latitude		Eaſt Longitude	
The Texel	53	15	05	10
Amſterdam	52	23	05	04
Rotterdam	51	55	04	36
The Brill	52	00	04	00
Sluice	51	14	03	43
Calais	50	58	01	54

The Coaſt of France and Portugal.

	North Latitude.		Weſt Longitude.	
Diep	49	56	01	09E
Cape de Hague	49	47	02	00
Gaſkets	49	50	02	20
Guernſey	49	33	02	20
Morlaix	48	33	03	49
Uſhant	48	30	05	02
Breſt	48	23	04	25
Penmark	47	48	04	24
Belliſle	47	20	03	16
Nantz	47	14	01	39
Iſland Dieu	46	34	02	13
Iſle of Ree	46	10	01	30
Rochel	46	10	01	11
Bourdeaux	44	50	00	38
Bilboa	43	29	02	58
Cape Ortegal	44	04	07	48
Cape Finiſter	43	12	09	40
Oporto	41	10	09	25
Burlings	39	35	09	24
Rock of Liſbon	38	54	09	50
Cape St. Vincent	36	53	09	06
Cadiz	36	33	06	01
Cape Trafalgar	36	10	06	01

On the Main Continent within the Straits.

Gibraltar	36	12N	04	53W
Cape de Gat	36	40N	01	40W
Cape Paul	38	15N	00	05W
Cape Martin	38	46N	00	40W

Places Names.	Latitude.		Longitude.	
	D.	M.	D.	M.
Barcelona	41	26	02	18W
Marſeilles	43	18	05	27W
	North Latitude.		Eaſt Longitude.	
Touloun	43	07	06	02
Genoa	44	25	08	43
Leghorn	43	28	10	35
Rome	41	54	12	45
Naples	40	51	14	46
Cape Sparteventuro	37	55	16	55
Cape Collone	38	56	18	05
Gallipoli	39	56	18	43
Cape St. Mary	39	45	19	00
Ancona	43	40	14	26
Venice	45	25	12	10
Lepanto	38	10	22	52
Cape Matapan	36	33	22	41
Cape St. Angelo	36	32	23	56
Athens	37	58	24	05
Cape Martelo S. Part of Negropont	38	07	25	03
Cape Monte Sancto	40	26	25	02
Galipoly	40	33	27	20
Conſtantinople	40	59	28	56
Smyrna	38	28	27	25
Epheſus	38	01	27	53
Antiocheta	36	30	32	46
Scanderoon	36	34	36	30
Tripoli	34	38	36	15
Alexandria	31	10	30	19
Cape Ruſato	32	48	21	25
Cape Miſerato	32	21	16	17
Tripoly	32	54	13	10
Cape Bona	37	03	11	04
Bona	37	02	08	19
Algier	37	05	03	16
C. de Tres Forcas	35	30	02	04W
Tetuan	35	27	05	06W
Ceuta	35	54	04	45W
Tangier	35	42	05	22W

Places Names.	Latitude.			Longitude.		
Iſlands within the Straits.	D.	M.		D.	M.	
Alboran	35	54	North Latitude.	00	29W	
Formentaria	38	33		01	55	Eaſt Longitude.
Yvica	38	50		01	40	
Majorca City	39	30		03	03	
Port Mahon	39	42		04	12	
Gallita	37	41		08	44	
S. End of Sardinia	38	46		09	12	
N. End of Corſica	42	56		09	50	
Gorgona	43	34		09	38	
Captia	43	03		14	54	
Lilboa	42	45		11	00	
Meſſina	38	07		16	20	
Maritimo	38	12		17	09	
Cape Paſſaro	36	38		15	40	
Malta	35	53		14	32	
Corfu	39	42		20	06	
Zephalonia	38	15		21	00	
Zant	37	46		21	14	
Morea	36	52		21	32	
Lemnos	39	59		25	37	
Scio	38	22		26	12	
C. St. John, Weſt End of Candia	35	15		24	00	
C. Solomon Eaſt End of Candia	35	00		27	08	
City of Rhodes	36	42		28	05	
Weſt end of Cyprus	34	57		33	23	
Eaſt end of Cyprus	35	31		35	00	

The Coaſt of Barbary and Guinea.

Places Names.	Latitude.			Longitude.		
	D.	M.		D.	M.	
Cape Spartel	35	50N		05	49W	
Sallee	33	51N		06	25W	
Cape Cantin	32	36N		09	10W	
Cape de Geer	30	27N		10	06W	
Cape Bajadore	26	04N		15	35W	
Cape Olerado	23	41N		15	50W	
Cape Blanco	20	32N		17	35W	
Senegal	15	28	North Latitude	16	25	Weſt Longitude.
Cape de Verde.....	14	43		17	20	
River Gambia	13	08		15	31	
Sierralion	08	36		12	57	
Cape Monſerado	06	05		10	02	
Cape Palmas	04	13		06	45	
Jaque Jaque	04	16		02	47	
Aſſinee	04	15		02	17	
Cape Three Points	04	28		01	50	
River Volta	05	55		03	25	Eaſt Longitude.
River Formoſa	07	00		07	20	
Cape Formoſa	04	15		06	40	
New Callabar	04	42		08	33	
Old Callabar	04	10		09	45	
River Camaroons	03	25		10	10	
River Angra	00	50		10	01	
Cape Lopez	00	55	South Latitude	09	55	
River Congo	05	40		15	25	
Angola	08	57		15	56	
Cape Negro	16	08		12	31	
Cape St. Thomas	24	10		14	43	
C. Bona Eſperance	34	07		19	35	

The Weſtern Iſlands.

Places Names.	Latitude.			Longitude.		
Corvo	39	54	North Latitude.	30	55	Weſt Longitude.
Flores	39	32		30	54	
Fial	38	53		28	15	
Pico	38	40		27	20	
St. George	38	52		26	03	
Tercera	38	57		25	34	
St. Michael	38	06		23	36	
St. Maries	36	59		23	38	

The Canary Iſlands.

Places Names.	Latitude.		Longitude.	
Ferro	27	54N	17	45W
Palma	28	40N	17	36W
Gomera	28	06N	17	05W

Places Names.	Latitude.			Longitude.		
The Canary Iſlands.	D.	M.		D.	M.	
Teneriff	28	23	North Latitude	16	28	Weſt Longit.
Madeira Weſt End	32	44		17	26	
Porto Sancto	33	12		15	54	
Canaria	27	52		15	10	
Forteventura	28	05		13	36	
Lancerota	29	02		12	45	

Cape de Verde Iſlands.

St. Vincent	17	04	North Latitude.	24	39	Weſt Longitude.
St. Lucia	17	00		24	30	
St. Nicholas	16	50		23	48	
Brava	14	28		24	02	
Fuego	14	50		23	41	
St. Jago	15	08		22	56	
Iſle of May	15	14		22	02	
Iſle Sal	16	50		22	08	
Bonaviſta	16	05		22	07	

The Southern Iſlands.

St. Matthews	01	30S	06	01W
Aſcenſion	07	40S	14	25W
St. Helena	16	00S	06	14W
Fernandepo	02	40N	10	30E
Princes	01	40N	09	15E
St. Thomas	00	00	08	20E
Annabona	02	10S	07	27E

The Coaſt on the Main Continent in the Eaſt Indies.

Cape Lagulias	34	54S	21	20	Eaſt Longitude.
Cape Corientes	23	40S	36	17	
Moſambique	15	04S	41	10	
River de Fugos	00	14S	41	15	
Cape Baſſos	04	06N	47	38	
Cape Guardafoy	11	44N	51	20	
Cape Roſulgat	22	41N	59	45	
Cape Muca	23	32N	59	45	

Places Names.	Latitude.			Longitude.		
	D.	M.		D.	M.	
Buſſera	29	45	North Latitude.	49	20	Eaſt Longitude.
Surrat	21	10		72	25	
Goa	15	31		73	50	
Callicot	11	16		75	30	
Cochin	09	54		75	55	
Cape Comarine	07	50		77	25	
Fort St. George	13	11		80	32	
Dew Point	16	08		81	32	
Viſegapatam	17	43		83	57	
Cape Palmiras	20	42		87	52	
Bengal	22	17		92	21	
Cape Negrais	16	23		93	00	
Malacca	02	12		102	10	
Siam Entrance	14	18		100	55	
Cambodia Entrance	10	28		105	00	
Cochin	14	05		107	56	
Canton	23	14		113	06	
Amoy or Quemoy	24	35		116	50	
Lampo	29	59		120	35	
Nanquin	32	55		120	01	

Iſlands in the Eaſt Indies.

Madagaſcar or St. Laurence	S. end	25	47		46	10	
	N. end	12	10		51	05	
Mayetta		13	10	South Latitude.	45	38	Eaſt Longitude.
Mohillo		12	05		44	23	
Comero		11	40		43	50	
St. Juan de Nova		16	30		42	40	
Mauritius		20	10		52	55	
Diego Roys		19	50		61	30	
Romiras de Caſtelamas	.....	8	45		67	17	
Amſterdam		38	40		72	45	
St. Brandon		16	38		64	30	
Diego Gratioſa		08	40		68	25	
Quebella		03	53		52	30	

Places Names.	Latitude.			Longitude.		
Iſlands in the Eaſt Indies.	D.	M.		D.	M.	
Baſſos de Chagos	06	55S.		68	36	Eaſt Longitude.
Yas de Diego Rays	00	20	North Latitude.	72	00	
Maldivia N. end	07	14		73	04	
Maldivia S. end	00	25		76	22	
Malique	09	00		72	58	
Sacatra	12	21		54	05	
Abdeleur	12	04		53	04	
C. Gallo in Zeloan	06	07		81	15	
Yas de Amber	00	00		52	30	
Andaman	12	10		93	32	
Nicobar	07	11		93	40	
Sumatra N. W. end	05	22		94	50	
Verkins Iſland.	02	22		94	07	
Naſſau Iſland	02	54	South Latitude.	99	32	
Bencola	03	55		104	08	
Sumatra S. E. end	05	22		105	10	
Engano	05	50		101	43	
Selam	08	20		102	13	
Princes Iſland	06	30		104	02	
Batam in Java	06	11		105	55	
Batavia	06	16		106	46	
Java E. end	08	32		113	30	
Straits of Sundy	06	02		105	46	
Banca S. end	03	20		106	45	
Borneo S. point	03	54		113	37	
Bandy Iſles	04	55		127	17	
Celebes S. end	05	10		119	07	
Celebes N. end	01	42	North Latitude.	121	20	
Mindano W. point	06	40		119	15	
Borneo North point	07	10		113	05	
Luconia SW point	12	30		120	10	
Luconia NE point	18	35		120	05	
Anian W. point	19	30		107	00	
Anian E. point	19	55		109	55	
Formoſa S. point	22	00		119	56	
Formoſa N. point	25	30		120	45	
Piſcadore Iſles	23	30		118	35	
Iſland Chuſan	30	38		120	35	
Japan SE. point	35	30		140	30	
Japan SW. point	35	00		128	30	

Places Names.	Latitude.			Longitude.		
The Coaſt of America, in the South Sea.	D.	M.		D.	M.	
Cape St. Sebaſtians	42	45	North Latitude.	127	55	Weſt Longitude.
Cape St. Lucia	23	20		111	46	
Cape Corientes	19	40		109	30	
Acapulco	17	05		104	18	
Aquatulco	15	27		102	03	
Guatimala	14	25		101	00	
Panama	08	50		81	52	
Bay Bonaventura	03	24		78	06	
Iſle Gallopega	00	00		90	10	
Cape del adjugo	06	30	South Latitude.	84	50	
Lima	12	15		77	30	
Arica	18	29		73	10	
La Serena	29	00		76	22	
I. Juan Fernando	33	15		83	18	
Baldivia	39	35		81	10	
Port Steven	46	50		82	36	
Cape Victory	52	00		83	10	
Cape Horn	57	58		79	55	

The Coaſt of Brazil from Cape Horn to Cape Roque.

Magellan E. Entr.	52	00	South Latitude.	75	05	Weſt Longitude.
River Julian	48	40		74	34	
C. Blanco near River Camaroons	46	50		72	07	
Buenos Ayres or River Plate	36	10		57	54	
River Grand	31	55		52	00	
St. Katharine's	27	50		49	00	
Cape Frio	23	00		42	20	
Spirito Sancto	19	59		42	10	
P. Segura	16	31		40	35	
Bay Todos Sanctos	12	46		41	00	
River St. Franciſco	10	50		37	50	
Cape St. Auguſtine	08	35		35	20	
Cape Roque	05	00		35	47	
Triſtian de Cunha	37	05		13	24	
Trinidada	20	30		30	00	

Places Names.	Latitude.		Longitude.	
Main Continent in the Weſt Indies.	D.	M.	D.	M.
R. Amazons Entr.	00	00	49	56
North Cape	02	05	49	56
Surinam	06	25	56	50
Oronoque...........	08	15	59	25
Cape Conquibaca	12	40	70	42
Carthagena	10	28	75	21
Scotch Settlement	08	30	78	45
Nicaragua Entran.	11	25	84	15
Cape Catoche	21	10	86	10
Campechy	19	30	92	10
Le Vera Cruz	19	12	97	48
Eſcondido	30	20	89	30
Cape Florida	24	57	80	30

North Latitude. West Longitude.

The Caribbee Iſlands.

Trinidado....	10	15	60	17
Tabago Weſt end	11	10	59	10
Granado	11	57	60	20
Barbadoes...........	11	58	58	50
St. Vincent	13	12	60	12
St. Lucia	13	55	60	04
Martinico...........	14	43	60	54
Dominico...........	15	23	60	30
Marigalante	15	58	60	20
Guadalupe	16	10	61	15
Montſerat...........	16	45	62	15
Antigua	17	05	61	45
Nevis	17	05	62	32
St. Chriſtophers	17	17	62	40
Barbuda	17	56	60	40
St. Bartholomew	17	52	62	06
St. Martins	18	06	62	10
Anguillo	18	17	62	13
Virgins	18	30	63	25
St. Cruz	17	52	63	30
Bieque	18	00	63	15
P. Rico St. John's	18	30	65	37
St. Domingo Hiſp.	18	25	69	30
P. Royal Jamaica	17	40	76	32

North Latitude. West Longitude.

Places Names.	Latitude.		Longitude.	
	D.	M.	D.	M.
Eaſt-end of Cuba	20	15N.	73	55W
Havanna	22	40N.	82	55W
Bay of Hondy.....	22	45N.	83	40W
Cape St. Anthony	21	45N.	85	32W

Bahama Iſlands.

Bermudas...........	32	25	63	40
N. Point of Bahama Bank	28	00	78	35
Bahama Iſland.....	26	50	79	36
Abacco S. Point	26	00	73	46
Harbour Iſland	25	37	76	47
Andros N. Point	25	10	78	50
Providence	25	00	77	20
Illathera S. Point	24	40	75	56
Cat Iſland...........	24	25	75	09
Watling Iſland	24	03	74	35
Rum Key...........	23	45	74	50
Exuma	23	22	75	55
Crooked Iſland N. Point	22	56	74	12
Atkins Key	22	17	74	05
Meraparvouz	21	58	74	45
Atwoods Key	23	10	73	35
French Keys	22	40	73	40
Mayaguanna	22	35	72	46
Hogſties	21	17	73	55
Heneago	20	52	73	46
Caicos Bank N. Point...........	21	50	71	15
Turks Iſland	21	35	70	08
Abrolho N. Point	21	35	69	06
Plate Wreck	20	10	68	15

North Latitude. West Longitude.

Places Names.	Latitude.			Longitude.		
The Coaſt of Carolina, Virginia, Maryland, Penſilvania, New England and Newfoundland.	D.	M.		D.	M.	
CharlesTown upon Aſhley River	32	45		78	46	
Cape Hatteras	35	15		74	20	
Cape Henry	37	00		75	24	
Cape Charles	37	16		74	16	
Cape Hinlopen	38	50		74	56	
Long Iſland	40	50		72	45	
New York	40	58		73	53	
Cape Cod..........	42	12		68	55	
Boſton	42	30	North Latitude.	69	23	Weſt Longitude.
Cape Sable	43	50		64	58	
Iſle Sable	44	20		59	00	
Cape Britain	46	00		58	31	
Quebec	46	55		69	48	
Bay of Breſt	52	10		56	57	
Bell Iſland..........	52	07		55	35	
Cape St. John	50	15		52	48	
Cape Bonaviſta	49	15		52	12	
Trinity Bay Entr.	48	42		52	20	
Conception Bay	48	20		52	08	
St. John's Harbour	08	40		51	39	
Bay of Bulls	47	50		51	29	
Cape Race	46	40		51	52	
Cape St. Mary.....	47	10		53	23	
Placentia	47	45		53	58	
Cape Roy	48	00		57	40	

The Coaſt of Hudſon's Bay and Straits.

Places Names.	Latitude.			Longitude.		
	D.	M.		D.	M.	
Buttons Iſle	60	25		66	27	
Cape Charles	62	10	North Latitude.	75	35	Weſt Longitude.
Cape Walſingham	62	35		77	55	
Mansfield Iſle	61	42		80	30	
Cape Jones	54	55		78	58	
Rupers River	51	30		79	26	
Albany River	52	26		84	50	
The Cubbs	54	10		82	40	
C. Henrietta Maria	55	07		84	30	
Port Nelſon	57	10	North Latitude.	93	58	Weſt Longitude.
Cape Churchill	59	00		95	20	
Cape Southampton	61	55		86	48	
Shark Point	64	30		82	55	
Nottingham Iſle	63	30		79	53	
Q. Ann's Foreland	63	48		74	45	
Reſolution Iſle	61	50		65	04	
Cape Farewell	59	45		46	45	

The Coaſt of Iceland, Greenland, Nova Zembla, and Northern Iſles.

Places Names.	Latitude.			Longitude.		
	D.	M.		D.	M.	
Sound Royal	66	22		14	33	
Bargazar Point.....	66	20		16	35	Weſt Longitude.
Whales Back	65	27		20	33	
MerchantsForeland	63	25		17	05	
Halliford	64	30		34	43	
Fair Foreland	66	20		26	27	
Grims Iſland	67	15		22	34	
Weſtmania Iſles	63	30		22	24	
Iyes of Fero	62	06	North Latitude.	05	00	
Beerengberg, or John Main's Iſle	71	45		04	30	
Point Look-out	76	25		15	36	
Horn Sound	76	45		13	36	
Fair Foreland	79	20		10	52	Eaſt Longitude.
Hacluits Foreland	79	55		11	00	
Helie's Sound	78	55		21	50	
Lees Foreland	78	05		23	25	
Whales head	77	18		21	30	
Hope Iſland	76	18		23	45	
Cherry or Bear Iſle	74	30		18	08	
Admiralty Iſle	75	05		54	50	
Fretum Borough	70	00		61	20	
Cape Candinoſe	69	05		42	35	
Catnoſe	65	43		35	14	

Places Names.	Latitude. North Latitude.		Longitude. East Longitude.	
The Coaſt of Iceland, Greenland, Nova Zembla, & Northern Iſlands.	D.	M.	D.	M.
Archangel Bar.....	64	30	40	30
Croſs Iſland	66	31	36	33
Sweetnoſe	68	10	34	45
Kilduyn	69	30	31	20
North Cape	71	23	23	02
Surroy	71	05	16	40
Tromſound	70	25	15	30
Lœfor S. W. Point	68	15	09	30
Dronten	63	50	10	15
Stadland	62	10	04	38
North Bergen	60	10	05	40
Naze of Norway	57	45	07	24

The Coaſt in the Sound and Baltick.

Mardon	58	19N.	08	57E.
Larwick	58	54N.	09	20E.
Chriſtiana	59	20N.	10	00E.
Maeſterland	57	53N.	11	45E.
Gottenburgh	57	50N.	12	15E.

Places Names.	Latitude. North Latitude.		Longitude. East Longitude.	
	D.	M.	D.	M.
Elſinore	56	22	12	42
Copenhagen	55	41	12	50
Valſterborn	55	28	13	00
Kalmer	56	40	16	35
Stockholm	59	20	19	30
Wybourgh	60	52	29	16
Peterſburgh	60	00	30	25
Narva	59	27	28	25
Revel..............	59	27	24	51
Riga	57	04	25	15
Derwinda	57	15	22	06
Koningſberg	54	43	21	35
Dantzick	54	22	18	36
Wiſby in Gotland	57	30	18	30
Bornholm..........	55	15	14	45
Straelſoun	54	25	13	16
Lubeck	54	06	09	55
Anout	56	50	11	06
Leſon	57	05	10	30
Scaw	57	30	10	20

The latitudes of any two places being given, to find the difference of latitude between them.

Rule. If the latitudes are both north, or both ſouth, ſubtract the leſs from the greater, the remainder will be the difference of latitude.

But if one latitude be north, and the other ſouth, then add them together, and their ſum will be the difference of latitude.

Rules for Latitude.

The latitude ſailed from, and the difference of latitude being given, to find what latitude the ſhip is come into.

Caſe

Caſe 1ſt. When you ſail from north latitude to the northward, or from ſouth latitude to the ſouthward, add the difference of latitude (it being firſt brought into degrees, if need be, by dividing it by 60) to the latitude ſailed from, the ſum will be the latitude you are come into, of the ſame name with the latitude ſailed from.

Caſe 2d. When you ſail from north latitude to the ſouthward, or from ſouth latitude to the northward, ſubſtract the difference of latitude, if leaſt, from the latitude ſailed from, the remainder is the latitude come into, of the ſame name with the latitude you ſailed from.

But if the difference of latitude be biggeſt, then ſubtract the latitude, from the difference of latitude, the remainder will be latitude come into, of a contrary name to the latitude you ſailed from.

Rules for Longitude.

The longitude of any two places being given, to find the difference of longitude between them.

Rule. If the longitudes are both eaſt, or both weſt, ſubtract the leſſer from the greater, the remainder will be the difference of longitude.

But if one longitude be eaſt, and the other weſt, then add them together, and their ſum (if leſs than 180 degrees) will be the difference of longitude; (but if it be more than 180 degrees) then ſubtract it from 360 degrees, and the remainder will be the difference of longitude.

The longitude ſailed from, and the difference of longitude being given, to find what longitude the ſhip is come into.

Caſe 1ſt. When you ſail from eaſt longitude to the eaſtward, or from weſt longitude to the weſtward, add the difference of longitude to the longitude ſailed from, the ſum (if leſs than 180 degrees) is the longitude come into, of the ſame name with the longitude you ſailed from.

But if the ſum ſhould be more than 180 degrees, then ſubtract it from 360 degrees, and the remainder will be the longitude you are come into, of a contrary name to the longitude you ſailed from.

Caſe 2d. When you ſail from eaſt longitude to the weſtward, or from weſt longitude to the eaſtward, ſubtract the difference of longitude (if it be leaſt) from the longitude you ſailed from, and the remainder will be the longitude come into, of the ſame name with the longitude ſailed from.

But if the difference of longitude be the biggeſt, then ſubtract the longitude from the difference of longitude, and the remainder will be the longitude come into, of a contrary name to the longitude ſailed from.

A TABLE, *ſhewing how many Miles Anſwers to a Degree of* Longitude, *at every Degree of* Latitude.

D. L.	Miles	D. L	Miles.	D. L.	Miles.	D. L.	Miles.
1	59.99	23	55.23	45	42.43	67	23.45
2	59.96	24	54.81	46	41.68	68	22.48
3	59.62	25	54.38	47	40.92	69	21.50
4	59.86	26	53.93	48	40.15	70	20.52
5	59.77	27	53.46	49	39.36	71	19.54
6	59.67	28	52.97	50	38.57	72	18.55
7	59.56	29	52.47	51	37.76	73	17.54
8	59.42	30	51.96	52	36.94	74	16.53
9	59.26	31	51.43	53	36.11	75	15.52
10	59.08	32	50.88	54	35.26	76	14.51
11	58.89	33	50.32	55	34.41	77	13.50
12	58.68	34	49.74	56	33.55	78	12.48
13	58.46	35	49.15	57	32.68	79	11.45
14	58.22	36	48.54	58	31.79	80	10.42
15	57.95	37	47.92	59	30.90	81	9.38
16	57.67	38	47.28	60	30.00	82	8.35
17	57.37	39	46.62	61	29.09	83	7.32
18	57.06	40	45.95	62	28.17	84	6.28
19	56.73	41	45.28	63	27.24	85	5.23
20	56.38	42	44.59	64	26.30	86	4.18
21	56.01	43	43.88	65	25.36	87	3.14
22	55.63	44	43.16	66	24.41	88	2.09
23	55.23	45	42.43	67	23.45	89	1.05

FINIS.